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Diversionary Foods and Forest Regeneration

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Introduction

When fishing with Pop, we always used live bait, because as he said, "It's easier to feed 'em than fool 'em." Recent work by Dr. Thomas Sullivan, Professor at the University of British Columbia and director of Applied Mammal Research Ltd., suggests that for foresters trying to establish young conifers, or protect young plantations from small mammal and bird damage, Pop's observation may be equally valid. Sullivan, and his occasional co-author Druscilla Sullivan, found that small mammal and bird damage, to seeds following large scale aerial seeding and to saplings, can be dramatically reduced by providing "diversionary food".

Diversionary food (generally sunflower seeds) has effectively reduced seed loss due to rodents and birds following aerial seeding of Douglas-fir (*Pseudotsuga menziesii)* and lodgepole pine (*Pinus contorta*). It has also reduced red squirrel debarking of lodgepole pine saplings.

Direct seeding of cutovers in temperate coniferous forests of North America has often been hampered by seed predation by rodents and birds. Indeed, direct seeding has generally failed as a reliable reforestation practice in most of North America, quite possibly because of the timing. The majority of direct seeding in Canada has occurred during the fall (the time of natural seed drop). These seeds then experience natural stratification and if they survive, they germinate in the spring. There is, however, a problem associated with this schedule. Although small mammal populations vary year-to-year, they also vary considerably during the year, and consistently reach peak densities during the fall. Seedfall from artificial seeding cannot approach the seed densities that occur following a "good seed year". So although conifer seeds are naturally shed when small mammal populations are high, in good seed years they are shed at such high densities that even the abundant small mammal populations cannot gather and destroy them all.

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Seed Loss

These points argue for NOT seeding in the fall. Late winter (after most of the snow is gone) or spring seeding is recommended, as these are times of low small mammal and bird population densities. Clearly, seeds distributed at this time will need to be laboratory stratified, and cast over a scarified site, one that provides adequate mineral soil for germination and establishment. Seeding in the spring as opposed to the fall should decrease small mammal and bird related seed loss. Sullivan's work shows that when late winter or spring seeding is accompanied by the addition of a diversionary food like sunflower seeds, either alone or with added whole oats, seed loss can be reduced dramatically.

The following mixtures, which include 12,500 seeds of each crop species, have been successfully used for spring aerial seeding of one hectare: (1) 0.11 kg **Douglas-fir** seeds, 46 kg sunflower seeds, 5.5 kg whole oats, or 64 kg sunflower plus the Douglas-fir seed; (2) 0.04 kg **lodgepole pine** with 18 kg sunflower seeds. To be successful, however, it is critical that seeds be stratified for at least three weeks before seeding.

These mixtures produced 70% survival of Douglas-fir seed after two weeks and 50% after four weeks. This compared with 5% survival of fir during the same time without alternative food. It produced 50-85% lodgepole pine survival after three weeks and 42-72% after six weeks, which compared with 12-15% and 8-10% pine survival after three and six weeks, respectively, without sunflower seeds. No comparisons with fall sown seeds were provided, but it is expected that survival of fall seeding would be much lower than was found in the no-sunflower spring treatments reported here.

Cost and Equipment

The Sullivans state that stand establishment using diversionary foods costs less than half that of planting. Their papers provide specifics about equipment and techniques for both aerial and ground applications of conifer seed and diversionary foods. Sullivan and Sullivan (1984) Research Note No. 97 provides the best "cook book" for this operation, and could likely be modified for Ontario species.

Sapling Debarking

When eating the vascular tissue of young trees (debarking), many small or medium sized animals damage conifer saplings. Voles, red squirrels, snowshoe hares, and porcupines can cause serious problems in young stands. Sullivan (1990) suggests various ways to minimize damage from deer and elk, snowshoe hares, voles, and porcupines, and found that sunflower seeds are an excellent diversionary food which, when appropriately used, minimize red squirrel damage to lodgepole pine saplings (Sullivan and Klenner 1993). Manual application of seed reduced red squirrel sapling damage to 11.3%, compared with 57.5% damage in untreated plots. Aerial application of seed reduced sapling damage to a similar degree. Interestingly, damaged saplings were consistently the fastest growing (diameter) trees.

Conclusions

It would seem that diversionary foods hold significant promise for many Ontario-based forestry operations, either in conjunction with aerial seeding, or to protect young stands from damage. Scientists at the Ontario Forest Research Institute are presently planning to protect planted acorns with diversionary foods. The key to successful diversionary food use is to understand the particular species responsible for the damage, the time when damage is taking place, and what diversionary food may be appropriate. Clearly, spreading diversionary foods at an inappropriate time could increase populations, so careful thought must be given to using this technique. (Any small mammal population increases, however, are likely to be very short-lived.) In minimizing small mammal and bird related seed removal following aerial seeding, and red squirrel caused sapling damage, it was clear that spring treatments worked well in British Columbia. Treatments that followed snowmelt would likely be equally effective in Ontario.

So if you're fishing for ways to reduce reforestation costs, or protect established seedlings or saplings, you may want to consider the advantages of diversionary foods. It is quite possible that this technique could become a valued tool in Ontario's reforestation efforts.

References

(Most of the above was based on the following articles. Interested individuals should consult those articles, or contact Dr. Tom Sullivan (604-494-7160 - FAX:494-7260) for more details.)

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